REMARKS

Applicant appreciates the thoroughness with which the Examiner has examined the above-identified application. Reconsideration is requested in view of the remarks below.

Rejection under 35 USC § 112, first paragraph

Claims 5 and 6 stand rejected under 35 USC 112, first paragraph, for failing to comply with the written description requirement, namely, for the term induction heating "without plastic deformation."

Support for the term "without plastic deformation" in connection with induction heating is found in the specification at page 5, lines 18-28 and at page 11, line 25 to page 12, line 7, where no plastic deformation is described while heating to the Ac3 transformation point or higher. The specification does not state that the claimed heating method of the present invention, to an Ac3 transformation point or higher, is during hot rolling. The reference to "a hot rolled wire rod" in the Example is to the fact that the starting material had previously been hot rolled, and not that it was currently undergoing hot rolling while the described heating was taking place. Wire rod and other steel products that had originally been hot rolled are often subsequently described as such when they are used as the starting materials in other processes, such as the drawing that applicants describe in their Example. In the same way, applicant describes in the Example that he starts with wire rod that was originally hot rolled, but then describes the subsequent heating method of the present invention as being made with the use of a high frequency induction heater to raise the temperature to an Ac3

transformation point or higher. No plastic deformation is described in connection with such induction heating.

The case cited by the Examiner, *Ex parte Parks*, 30 USPQ2d 1234, 1236 (BPAI 1993), supports applicant's position. In the *Parks* case, the absence of any mention of the use of a catalyst was found to support the concept of practicing the method in the absence of a catalyst. The Board stated "[t]hroughout the discussion which would seem to cry out for a catalyst if one were used, no mention is made of a catalyst." *Id.* Likewise, in the present application, the description of the induction heating step would "cry out" for mention of plastic deformation if one were indeed employed. This is because the application was specifically concerned with plastic deformation, i.e., in subsequent cold forging. The fact that no plastic deformation was mentioned during the induction heating step supports the concept that none was used.

Accordingly, the originally-filed specification supports applicant's claim to heating steel to an Ac3 transformation point or higher without plastic deformation.

Rejection under 35 USC § 103

Claims 1-6 stand rejected under 35 USC § 103 as being obvious from Ahn et al. U.S. Patent Publication No. 2003/0066576. Applicant respectfully traverses this rejection.

In the claimed method of the present invention as described in claim 3, applicant induction heats the steel to an Ac3 transformation point or higher so that an austenite grain size is 5 – 20 μm, and cools the heated steel. Subsequently, the cooled steel is heat treated at a tempering parameter (P) ranging from 21,800 to 30,000, where P is expressed by the equation:

$$P = 1.8 \times (T + 273) \times (14.44 + \log t)$$

wherein, T is a tempering temperature expressed in °C and t is a tempering time expressed in sec. The resulting tensile strength is 70 – 130 kgf/mm^2 and impact absorption energy is 60 J/cm^2 or more at –40°C,

Applicant's quenched and tempered steel wire is defined in claims 1 and 2 with the same composition, austenite grain size, tensile strength and impact absorption energy as recited in method claims 3-6.

Neither applicant's method nor resulting quenched and tempered steel wire is obvious from the Ahn publication, which is also by the applicant. While the Ahn publication seeks good cold forging properties for high strength quenched and tempered steel wires, it discloses a different process and parameter than the present invention, which process and parameter do not achieve the tensile strength and impact absorption energy as claimed by applicant in the instant application. Although the cited Ahn publication discloses a heating process and the austenite grain size in a range partially overlapping that of the present invention, it does not disclose or suggest the particular combination of austenitic grain size, tensile strength and the tempering parameter P as disclosed and claimed by applicant here. It is this novel and unobvious combination of parameters that achieves the unexpected advantage of high tensile strength and impact absorption energy to permit excellent cold forging of the steel wire.

The inventor of the present invention actually and identically produced samples under the conditions disclosed in the cited Ahn publication, i.e., the similar component, the condition of the heating process, and the austenite grain size, and compared the result of the sample test with the result of the present invention. This is in fact shown in the comparison in Table 2 of the specification of the instant application.

Referring to Table 2, it can be noted that all of the comparative samples (CO. EX. 1-13) produced under the disclosed conditions of the Ahn publication do not achieve the impact absorption energy 60 J/cm^2 or higher at - 40°C. This belies any assertion that the samples processed with the identical material and process to that of the Ahn publication will inherently have the impact absorption energy of the present invention. The inventor of the present invention unexpectedly found that even though the identical material and process was used, the impact absorption energy at - 40°C could be substantially differentiated according to the combination of the tensile strength, the grain size, and the tempering parameter P. That is, it could be found that when anyone among the three conditions does not belong to the range of the numerical value claimed in the present invention, it was impossible to obtain the impact absorption energy 60 J/cm^2 or higher at - 40°C.

This establishes the criticality that in order to obtain the high impact absorption energy at - 40°C, the organic relation between the tensile strength, the grain size, and the tempering parameter P is very important and must meet the values recited in applicant's claims. The cited Ahn publication makes no suggestion of the criticality of any of these parameters and, further, does not even recognize the tempering parameter P in any manner. By contrast, the Ahn publication relies only on the parameter n x YS to determine suitability for cold forging, where n is the work hardening coefficient and YS is the yield tensile strength. Neither of these prior art parameters involves the components of the instant claimed tempering parameter P, which are tempering temperature and tempering time in a logarithmic relationship. Therefore, the present invention specifies and simplifies the tempering through the introduction of the tempering parameter P in such a way as for anyone to easily apply it to produce a

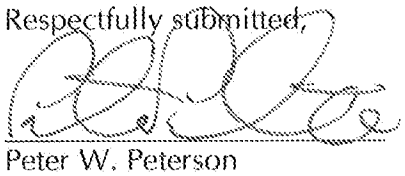
quenched and tempered steel wire of the claimed excellent impact absorption energy and tensile strength which can be cold forged.

Accordingly, applicant's claimed process parameters and the properties of steel wire produced therby are not obvious from, and patentably distinct over, the disclosure of the Ahn publication.

Applicant has amended claims in this application. Applicant is not conceding in this application that the claims as they stood prior to amendment are not patentable over the art cited by the Examiner, as the present claim amendments and cancellations are only for facilitating expeditious prosecution and allowance of the claims. Applicant respectfully reserves the right to pursue these prior and other claims in one or more continuation and/or divisional patent applications.

It is respectfully submitted that the application has now been brought into a condition where allowance of the entire case is proper. Reconsideration and issuance of a notice of allowance are respectfully solicited.

Respectfully submitted,



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